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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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Development of USTES Aptitude Test Battery

for

Airplane Stewardess

(air trans.) 352.878

U.S. DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION

ED 068564

Technical Report on Development of USTES Aptitude Test Battery
For. . .

Airplane Stewardess (air trans.) 352.878

S-433

(Developed in Cooperation with the
Colorado State Employment Service)

Manpower Administration
U. S. Dept. of Labor

April 1969

FOREWORD

The United States Training and Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB Study #2737

DEVELOPMENT OF USTES APTITUDE TEST BATTERY

For

AIRPLANE STEWARDESS (air trans.) 352.878-010
S-433

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Airplane Stewardess (air trans.) 352.878-010. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
G - General Learning Ability	100
V - Verbal Ability	90
N - Numerical Ability	85
Q - Clerical Perception	100

RESEARCH SUMMARY

Sample:

76 female Airplane Stewardess Trainees employed by a Denver based airline.

This study was conducted prior to the requirement of providing minority group information. Therefore, minority group composition is unknown.

Criterion:

Supervisory ratings

Design:

Longitudinal (criterion not available until completion of probationary period six months after training.)

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude - criterion correlations and selective efficiencies.

Predictive Validity:

Phi Coefficient = .42 ($P/2 < .0005$)

Effectiveness of Norms:

Only 67% of the nontest-selected workers used in this study were good workers; if the workers had been test-selected with the above norms, 83% would have been good workers. 33% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 17% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1.

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	67%	83%
Poor Workers	33%	17%

SAMPLE DESCRIPTION

Size:

N = 76

Occupational Status:

Trainees

Work Setting:

Subjects were enrolled in a Stewardess training program for a Denver based airline.

Employer Selection Requirements:

Age: 18 years of age with parent or guardian permission or 21 years of age
Sex: Female
Education: High school graduate

Principal Activities:

Trainees were performing duties listed on Fact Sheet in Appendix, at the time ratings were obtained.

Minimum Experience:

None

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson-Product Moment Correlations with the Criterion (r) for Age and Education

	Mean	SD	Range	r*
Age (years)	20.6	1.3	19-26	.156
Education (years)	12.9	1.0	12-17	-.178

* None significant at the .01 or .05 level

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002 (IBM) and the Kuder Personal Preference Record (Form A) and the Kuder Vocational Preference Record (Form CH) were administered between August 12, 1961, and September 28, 1963.

CRITERION

The criterion data consisted of supervisory ratings of job performance obtained after the subject had completed a six-month probationary flight period following training. Job performance ratings were collected between December 1963 and May 1964. Each supervisor made two ratings; the second rating approximately three weeks after the first rating and independent of it.

Rating Scale:

USES Form SP-21, "Descriptive Rating Scale." (See Appendix)

Reliability:

Correlation between the first and second rating was .68. The final criterion was the total of the first and second rating.

Criterion Score Distribution:

Possible Range:	18-90
Actual Range:	41-81
Mean	63.9
Sigma	9.0

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 33% of the sample in the low criterion group. Workers in the high criterion were designated as "good workers" and those in the low criterion group as "poor workers." The criterion critical score is 60.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes K and M which did not have high correlations with the criterion were considered for inclusion in the norms because the qualitative analysis indicated that both were important for the job duties; the sample had a relatively high mean for aptitudes K and M and a relatively low standard deviation for aptitude K. A relatively high mean score or a relatively low standard deviation indicates that some sample pre-selection may have taken place. Aptitude V was included in the trial norms because it was considered to be critical to the job duties. Tables 3, 4, and 5 show the results of the qualitative and quantitative analyses.

TABLE 3

Qualitative Analysis
(Based on job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitude	Rationale
G - General Learning Ability	Necessary in order to comprehend material presented in training and to make evaluations of situations and decisions during flight.
V - Verbal Ability	Necessary in order to understand and communicate with instructors, passengers, other airline personnel, and to make out necessary reports, and to read and understand FAA rules and regulations.
Q - Clerical Perception	Necessary to perceive pertinent detail in tabular material such as reports, inventories, and log reports, and in verification of passenger lists and tickets.
M - Manual Dexterity	Necessary to skillfully demonstrate airplane safety equipment, and to serve meals and stock supplies and equipment in galley.

TABLE 4

Means, Standard Deviations (SD), Ranges, and Pearson Product Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

N = 76

Aptitudes	Mean	SD	Range	r
G - General Learning Ability	106.4	12.2	80-137	.225*
V - Verbal Ability	107.5	14.0	80-147	.124
N - Numerical Ability	104.7	12.2	77-132	.316**
S - Spatial Perception	106.4	16.5	74-156	.035
P - Form Perception	114.1	13.3	88-149	.117
Q - Clerical Perception	116.6	11.8	89-144	.254*
K - Motor Coordination	120.3	11.8	87-151	.173
F - Finger Dexterity	114.2	19.2	61-168	-.105
M - Manual Dexterity	114.9	19.6	54-157	-.021

* Significant at the .05 level of confidence
** Significant at the .01 level of confidence

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis									
Important	X	*				X			X
Irrelevant									
Relatively High Means						X	X		X
Relatively Low Standard Deviations	X		X			X	X		
Significant Correlation with Criterion	X		X			X			
Aptitudes to be considered for Trial Norms	G	V*	N			Q	K		M

* Considered critical to job duties

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of G, V, N, Q, K, and M at trial cutting scores were able to differentiate between 67% of the sample considered to be good workers and 33% of the sample considered poor workers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For two-aptitude norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample; for four-aptitude norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of G-100, V-90, N-85, and Q-100 provided the highest degree of differentiation for the occupation of Airplane Stewardess (air trans.) 352.378-010. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .42 (statistically significant at the .0005 level).

TABLE 6
Concurrent Validity of Test Norms
G-100, V-90, N-85 and Q-100

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	11	40	51
Poor Workers	17	8	25
Total	28	48	76

Phi Coefficient (Ø) = .42 Chi Square (X^2_y) = 13.6
Significance Level = P/2 < .0005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-9 which is shown in Section II of the Manual for the General Aptitude Test Battery. The OAP-9 norms of G-95, N-90, and Q-95 yield a Phi Coefficient of .24 which is statistically significant at the .025 level.

NON-COGNITIVE FACTORS

During the planning stage of this study, it became apparent that factors other than aptitudes might also contribute to the success of a Stewardess. For instance, not all individuals can work comfortably in an environment moving several hundred miles an hour at altitudes of 20,000 to 36,000 feet. In assessing this situation, it was decided to incorporate the Kuder Personal and Vocational Preference Records to determine if there was a relationship between success as a stewardess and preferences. Tables 7 and 8 show the means, SD, ranges, and correlations with the criterion for the factors measured by the Kuder Personal Preference Record (Form A) and the Kuder Vocational Preference Record (Form CH) respectively.

TABLE 7

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for the Kuder Personal Record

N = 76

	Mean	SD	Range	r
A - Active in groups	42.5	9.6	14-63	.176
B - Familiar Situations	30.6	8.9	11-54	-.311**
C - Working with Ideas	37.7	8.3	16-59	.041
D - Avoiding Conflict	48.6	8.6	26-64	-.266*
E - Directing Others	33.6	9.0	11-54	.259*

* Significant at the .05 level
** Significant at the .01 level

TABLE 8

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for the Kuder Vocational Record

N = 76

	Mean	SD	Range	r
Outdoor	33.9	14.3	10-69	-.132
Mechanical	21.8	8.7	8-46	-.117
Computational	18.9	7.8	3-35	-.027
Scientific	29.9	8.9	14-55	.073
Persuasive	42.5	11.1	17-68	.079
Artistic	31.7	9.7	7-52	-.247*
Literary	19.7	7.6	3-37	.155
Musical	15.2	6.2	2-30	.004
Soc. Science	57.1	13.3	12-78	.011
Clerical	47.5	13.7	12-85	.084

* Significant at the .05 level

Intercorrelations were computed for all factors measured by the General Aptitude Test Battery, Kuder Personal Preference Record, and Kuder Vocational Preference Record. The Wherry - Doolittle Multiple correlation formula was then applied to the intercorrelation data. The results of the multiple correlation analyses using positive and negative correlations in combination, as well as only positive correlation did not establish as good a selection battery as the one established using the GATB alone.

It appears that although some factors of the Kuder Tests do correlate significantly with job success, they are not sufficiently related to increase selectivity over that accomplished with the General Aptitude Test Battery.

SP-21
Rev. 9/63

APPENDIX

DESCRIPTIVE RATING SCALE

(For Airplane Hostess Aptitude Test Development Study)

Score_____

RATING SCALE FOR AIRPLANE STEWARDESS 352.878
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Rater", and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of Worker (print) _____
(Last) (First)

Company Job Title:_____

How often do you see this worker in a work situation?

☐ See her at work all the time.

☐ See her at work several times a day.

☐ See her at work several times a week.

☐ Seldom see her in work situation.

How long have you worked with her?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can she get done? (Worker's ability to make efficient use of her time and to work at high speed.)

☐ 1. Can perform only at an unsatisfactory pace. Almost never completes duties in required time.

☐ 2. Can perform at a slow pace. Usually completes duties in required time.

☐ 3. Can perform at an acceptable but not a fast pace. Completes duties in required time.

☐ 4. Capable of high work output. Can perform at a fast pace. Completes duties with ease in the required time.

☐ 5. Capable of very high work output. Can perform at an unusually fast pace. Has extra time for passengers.

B. How good is the quality of her work? (Worker's ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.

☐ 2. The grade of her work could stand improvement. Performance is usually somewhat inferior in quality.

☐ 3. Performance is acceptable. Quality is acceptable.

☐ 4. Performance is usually high in quality.

☐ 5. Performance is almost always of the highest quality.

C. How accurate is she in her work? (Worker's ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Reports need constant checking.

☐ 2. Makes frequent mistakes. Reports need more checking than is desirable.

☐ 3. Makes mistakes occasionally. Reports need only normal checking.

☐ 4. Makes few mistakes. Reports seldom need checking.

☐ 5. Rarely makes a mistake. Reports rarely need checking.

D. How much does she know about her job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with her work.)

- ☐ 1. Has very limited knowledge. Does not know enough to do her job adequately.
- ☐ 2. Has little knowledge. Knows enough to "get by."
- ☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.
- ☐ 4. Has broad knowledge. Knows enough to do good work.
- ☐ 5. Has complete knowledge. Knows her job thoroughly.

E. How much aptitude or facility does she have for this kind of work? (Worker's adeptness or knack for performing her job easily and well.)

- ☐ 1. Has great difficulty doing her job. Not at all suited to this kind of work.
- ☐ 2. Usually has some difficulty doing her job. Not too well suited to this kind of work.
- ☐ 3. Does her job without difficulty. Fairly well suited to this kind of work.
- ☐ 4. Usually does her job with ease. Well suited to this kind of work.
- ☐ 5. Does her job with great ease. Exceptionally well suited for this kind of work.

F. How large a variety of job duties can she perform efficiently? (Worker's ability to handle several different operations in her work.)

- ☐ 1. Cannot perform different operations adequately.
- ☐ 2. Can perform a limited number of different operations efficiently.
- ☐ 3. Can perform several different operations efficiently.
- ☐ 4. Can perform many different operations efficiently.
- ☐ 5. Can perform an unusually large variety of different operations efficiently.

G. How resourceful is she when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what she already knows to a new situation.)

☐ 1. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Practically always figures out what to do herself. Rarely needs help, even on complex problems.

H. How many practical suggestions does she make for doing things in better way? (Worker's ability to improve work methods.)

☐ 1. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ 2. Slow to see new ways to improve methods. Contributes few practical suggestions.

☐ 3. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ 4. Quick to see new ways to improve methods. Contributes more than her share of practical suggestions.

☐ 5. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and only these factors, how acceptable is her work? (Worker's "all-around" ability to do her job.)

☐ 1. Would be better off without her. Performance usually not acceptable.

☐ 2. Of limited value to the organization. Performance somewhat inferior.

☐ 3. A fairly proficient worker. Performance generally acceptable.

☐ 4. A valuable worker. Performance usually superior.

☐ 5. An unusually competent worker. Performance almost always top notch.

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FACT SHEET

JOB TITLE : Airplane Stewardess (air trans.) 352.878-010

JOB SUMMARY : Under general supervision of Chief Stewardess, is responsible for attendance at pre- and post-flight meetings, condition of passenger section of plane, passenger safety and comfort, supplies, and first aid treatment.

WORK PERFORMED: Attends pre-flight briefing session with other members of the flight crew in order to become informed with cargo load, route flown, number of passengers, weather conditions, time of departure and number and length of stopovers, and other factors pertaining to the flight.

Checks passenger list to become familiar with names, and destination of passengers, and notes any comments requiring special services such as wheelchair, needs for babies, etc. Checks first aid supplies and other items needed for the comfort and care of the passengers. Checks menu to insure that correct type and quantity of food and beverages are placed aboard plane prior to departure.

Greets individuals as they board the plane, asking their name and checking them on the passenger list; shows reserved seat passengers their location; helps passengers with coats and small luggage. Places passenger name in seat location chart for both reserved and non-reserved section. Makes certain that safety belts are fastened before take off and landing and gives safety instructions prior to flight, indicating location of oxygen masks and explaining their operation. Mentions other safety facts such as location of emergency exits. Answers passenger's questions about flight, weather, reasons for delay or change in route, etc. Distributes reading matter and pillows as requested. Serves hot and/or cold meals and beverages during flight, maintaining own balance as well as balance of food tray, especially during turbulence. Uses discretion during rough weather as to whether a meal should be served or not.

Completes flight report at destination concerning passengers, cabin, supplies, etc.; notes any unusual incidents that occurred during flight such as passenger illness or injury, or malfunctioning of cabin facilities that were reported to the Captain.

Learns about first aid, city and airline codes, twenty-four hour clock and reading of flight time table, pass policy and reduced rate transportation, various aspects of aircraft and flight, and many rules and regulations, both Federal and company.

EFFECTIVENESS OF NORMS: Only 67% of the nontest-selected workers used in this study were good workers; if the workers had been test-selected with the S-433 norms, 83% would have been good workers. 33% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-433 norms, only 17% would have been poor workers.

APPLICABILITY OF S-433 NORMS: The aptitude test battery is applicable to jobs which contain a majority of the job duties described above.

GPO 881-953

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